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10/598,185	04/20/2007	Li Ding	062924	1004

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EXAMINER

LOGIE, MICHAEL J

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2881

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/598,185	Applicant(s) DING, LI	
	Examiner MICHAEL J. LOGIE	Art Unit 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>See Continuation Sheet</u> . | 6) <input type="checkbox"/> Other: ____. |

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :08/21/2006, 11/28/2006, 02/26/2009.

DETAILED ACTION

Claim Objections

Claims 25, 26, 33 and 34 are objected to because of the following informalities:

- Claims 25 and 26 recite the exact same limitations, both dependent upon claim 19.
- Claims 33 and 34 disclose no limitations to the claims, just reference to the disclosure.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 33 and 34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it fails to point out what is included or excluded by the claim language.

This claim is an omnibus type claim

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-7, 10, 11, 14, 17-24, 27-28, 31 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Franzen (US pgPub 2005/0017167).

In regards to claim 1, Franzen teaches a method for dissociating ions in an ion trap (inherent in the devices shown in figures 1, 5 and 7-8), comprising the steps of switching a trapping voltage between discrete voltage levels ([0016] “The periods of zero voltage can be enlarged by using an RF voltage consisting of positive and negative pulses with periods of zero voltage in between”) to create a digital (although Franzen is silent with respect to a “digital trapping field”, it is inherent that this would be the case since “modern ion traps are largely controlled digitally” as taught by Franzen et al. (US patent no. 5,438,195, col. 2, line 55)) trapping field for trapping precursor ions and product ions in a trapping region of the ion trap (figs. 2 and 6, note: [0015]-[0017]), and injecting electrons into said ion trap (fig. 1, 9 and 10) while the trapping voltage is at a selected said voltage level whereby injected electrons reach the trapping region (figs. 2 and 6, note: “periods for ECD”) with a kinetic energy suitable for electron induced dissociation to take place ([0012], [0014], [0043]).

In regards to claim 2, Franzen teaches wherein the initial kinetic energy of the injected electrons is reduced to said kinetic energy suitable for electron induced dissociation to take place after the electrons have entered the ion trap ([0012] and [0043]).

In regards to claim 3, Franzen teaches wherein said trapping voltage is switched between two discrete voltage levels (fig. 2, [0038]).

In regards to claim 4, Franzen teaches wherein the electrons have a relatively low initial kinetic energy substantially suitable for electron induced dissociation ([0043]),

and are injected into said trapping region while the trapping voltage is at or close to zero volts (fig. 6, “periods for ECD”).

In regards to claim 5, Franzen teaches wherein the trapping voltage has three discrete voltage levels and electrons are injected into said trapping region while the trapping voltage has the lowest absolute voltage value ([0016] “The periods of zero voltage can be enlarged by using an RF voltage consisting of positive and negative pulses with periods of zero voltage in between”, discrete voltage level 1: positive pulse, discrete voltage level 2: negative pulse, discrete voltage level 3: zero voltage period, wherein the zero voltage period is the lowest absolute voltage value).

In regards to claim 6, Franzen teaches including using a magnetic field to guide injected electrons to the trapping region ([0016], “The electron injection may be guided by a magnetic field from a permanent or electro magnet”).

In regards to claim 7, Franzen teaches wherein said magnetic field is generated using an electrical coil arranged to be energised by a pulsed current ([0053]).

In regards to claim 10, Franzen teaches wherein the ion trap is a linear quadrupole ion trap (fig. 1).

In regards to claim 11, Franzen teaches wherein electrons are injected along the longitudinal axis of the ion trap from one end of the trapping region (as seen in figure 1).

In regards to claim 14, Franzen teaches applying a pulsed gate voltage (figs. 1 and 5, 9) to gating means to control extraction of electrons from an electron source for injection into said trapping region and synchronising application of said pulsed gate

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voltage with the step of switching said trapping voltage to said selected voltage level ([0037]).

In regards to claim 17, Franzen teaches wherein the trapped precursor ions include multiply-charged precursor ions, and the injected electrons have a kinetic energy less than 1eV and are capable of inducing electron capture dissociation of said multiply-charged ions ([0043]).

In regards to claim 18, Franzen teaches wherein the trapped precursor ions include multiply-charged precursor ions and including the step of introducing a gas into the trapping region of the ion trap whereby the injected electrons are captured by molecules of the gas and electrons are then transferred to the precursor ions to cause the dissociation ([0060]).

Claims 19-24, 27-28 and 31 are the device claims for the method stated above and therefore are rejected by Franzen on the same basis as cited above.

In regards to claim 35, Franzen teaches a tandem mass spectrometer including an ion trap as claimed in claim 19 ([0033]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 8, 9, 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franzen (US pgPub 2005/0017167) and further in view of Franzen (US pgPub 2005/0017165) (herein Franzen2).

In regards to claims 8, Franzen differs from the claimed invention by not disclosing wherein the ion trap is a 3-D quadrupole ion trap and electrons are injected into the trapping region through a hole in an end cap electrode of the ion trap.

Franzen2 teaches the ion trap is a 3-D quadrupole ion trap and electrons are injected into the trapping region through a hole in an end cap electrode of the ion trap (fig. 1).

Franzen2 modifies Franzen by teaching the ion trap as a 3D quadrapole trap.

Since both Franzen and Franzen2 teach ion trapping, it would be obvious to one of ordinary skill in the art to have the 3D trap of Franzen2 in the method of Franzen for three dimensional trapping.

In regards to claim 9, Franzen further differs from the claimed invention by not disclosing wherein the ion trap is a 3-D quadrupole ion trap and electrons are injected into the trapping region through a hole or slit in the ring electrode of the ion trap.

Franzen2 teaches wherein the ion trap is a 3-D quadrupole ion trap and electrons are injected into the trapping region through a hole or slit in the ring electrode of the ion trap (fig. 1, 26, [0035])

Franzen2 modifies Franzen by teaching the ion trap as a 3D quadrapole trap.

Since both Franzen and Franzen2 teach ion trapping, it would be obvious to one of ordinary skill in the art to have the 3D trap of Franzen2 in the method of Franzen for three dimensional trapping.

Claims 25 and 26 are the device claims for the method stated above and therefore are rejected on the same basis as cited above.

Claims 12, 13, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franzen (US pgPub 2005/0017167) and further in view of Reinhold (US patent no. 6,483,109).

In regards to claims 12 and 13, Franzen differs from the claimed invention by not disclosing introducing pulses of gas into the trapping region of the ion trap to cause collisional cooling of ions prior to or after dissociation, wherein said pulses of gas are introduced into the trapping region using a pulsed valve and a vacuum pump capable of rapidly reducing the gas pressure to below 10^{-4} mbar.

Reinhold teaches introducing pulses of gas into the trapping region of the ion trap to cause collisional cooling of ions prior to or after dissociation, wherein said pulses of gas are introduced into the trapping region using a pulsed valve and a vacuum pump capable of rapidly reducing the gas pressure to below 10^{-4} mbar (col. 13, lines 39-49).

Reinhold modifies Franzen by providing a pulsed gas valve for collisional cooling of the ions.

Since both Franzen and Reinhold teach a ion trap, it would be obvious to have the pulsed gas source of Reinhold in the method of Franzen because it would ensure desired initial conditions of the beam at the time fragmentation.

Claims 29 and 30 are the device claims for the method stated above and therefore are rejected on the same basis as cited above.

Claims 15, 16 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franzen (US pgPub 2005/0017167) and further in view of Ding et al. (US patent no. 7,193,207).

In regards to claim 15, Franzen differs from the claimed invention by not disclosing including applying a broadband dipole signal to the ion trap to remove product ions from the central region of the ion trap.

Ding et al. teach including applying a broadband dipole signal to the ion trap to remove product ions from the central region of the ion trap (col. 4, lines 14-24).

Ding modifies Franzen by teaching a broadband dipole signal.

Since both Ding and Franzen teach ion traps, it would be obvious to one of ordinary skill in the art to have the signal of Ding in the method of Franzen because it would a periodic waveform of a certain frequency preset by the mass control unit, with considerably high accuracy.

In regards to claim 16, Franzen differs from the claimed invention by not teaching including applying an AC dipole signal to the ion trap to selectively excite the precursor ions.

Ding teaches including applying an AC dipole signal to the ion trap to selectively excite the precursor ions (col. 4, lines 14-24).

Ding modifies Franzen by teaching an AC dipole signal.

Since both Ding and Franzen teach ion traps, it would be obvious to one of ordinary skill in the art to have the signal of Ding in the method of Franzen because it would a periodic waveform of a certain frequency preset by the mass control unit, with considerably high accuracy.

Claim 32 is the device claims for the method stated above and therefore are rejected on the same basis as cited above in claim 15.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pertinent prior art is closely related art that individually or in combination could be considered grounds for rejection. See references cited for a listing of the pertinent prior art found and the prior art found.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL J. LOGIE whose telephone number is (571)270-1616. The examiner can normally be reached on 8:00 to 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. J. L./

Examiner, Art Unit 2881

/ROBERT KIM/

Supervisory Patent Examiner, Art Unit 2881